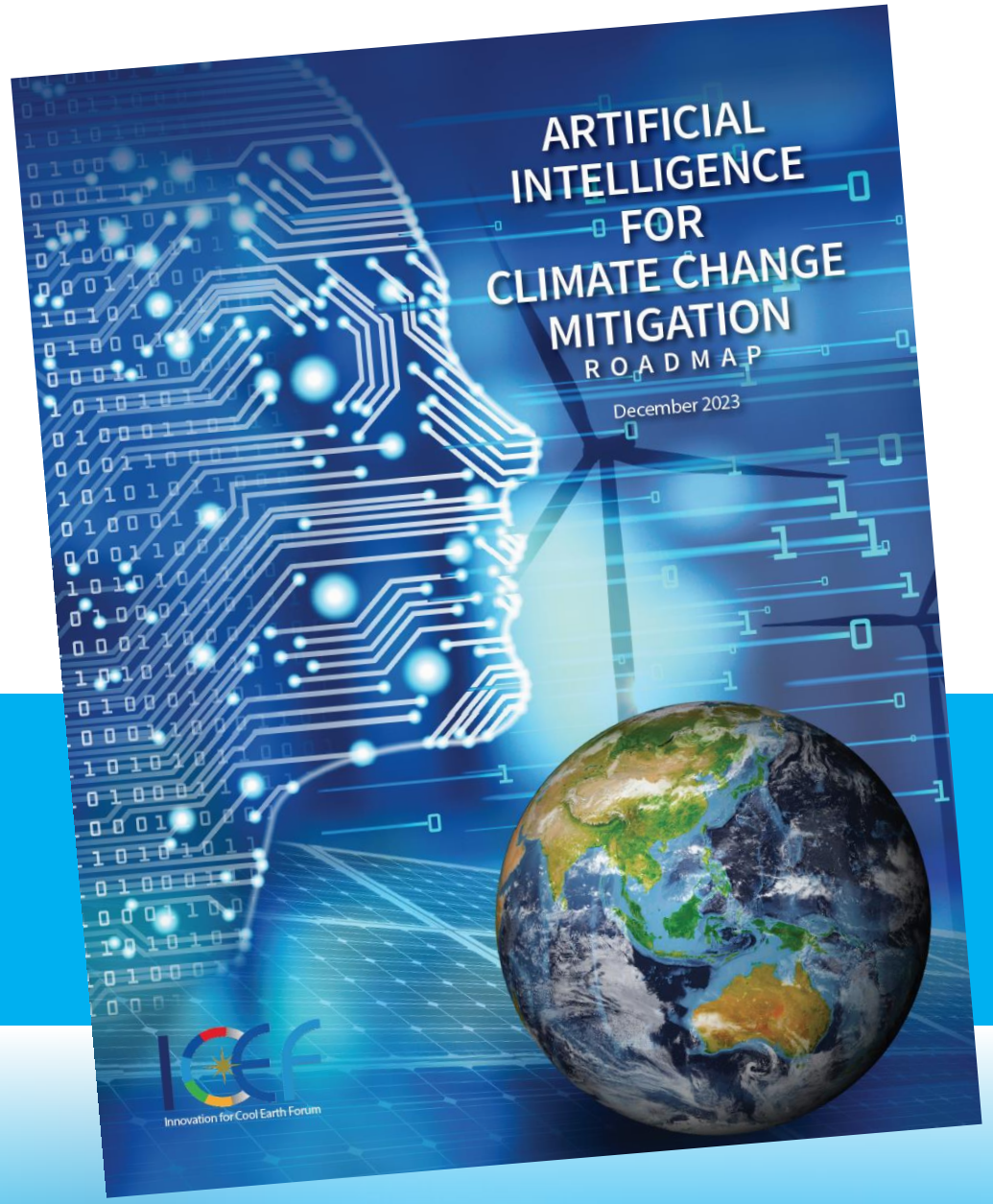

Innovation for Cool Earth Forum

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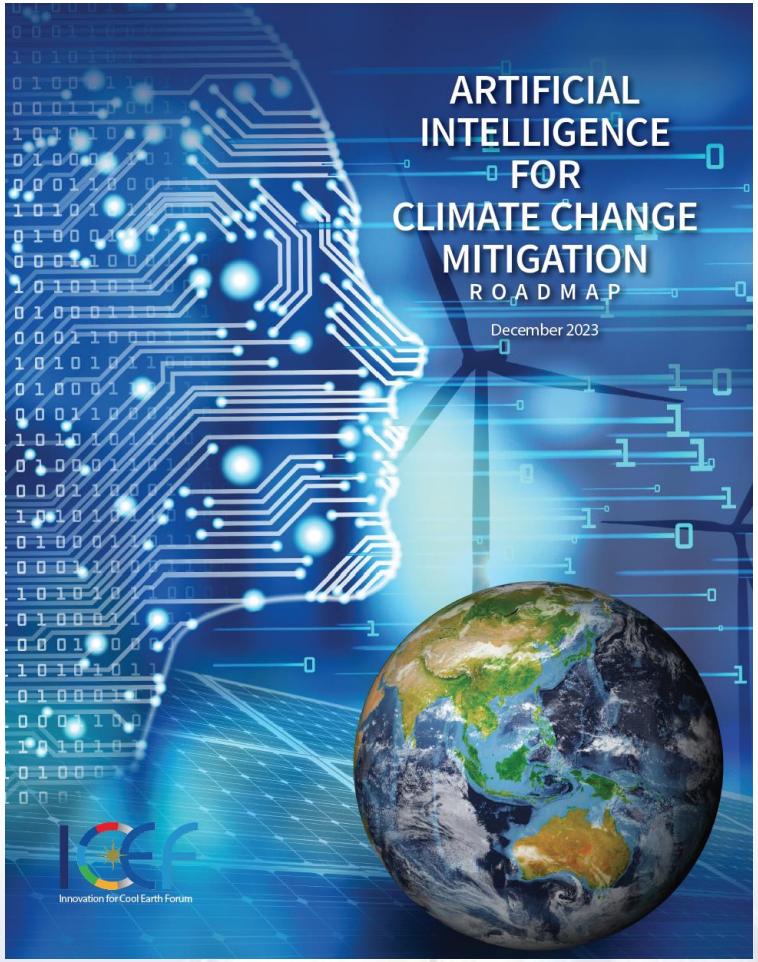
TERI-NRDC-NEDO
COP28
December 4, 2023

AI FOR CLIMATE CHANGE MITIGATION ROADMAP

TOPIC:

- ***HOW CAN AI HELP REDUCE EMISSIONS OF GREENHOUSE GASES?***



AI FOR CLIMATE CHANGE MITIGATION ROADMAP

PART I: **BACKGROUND**

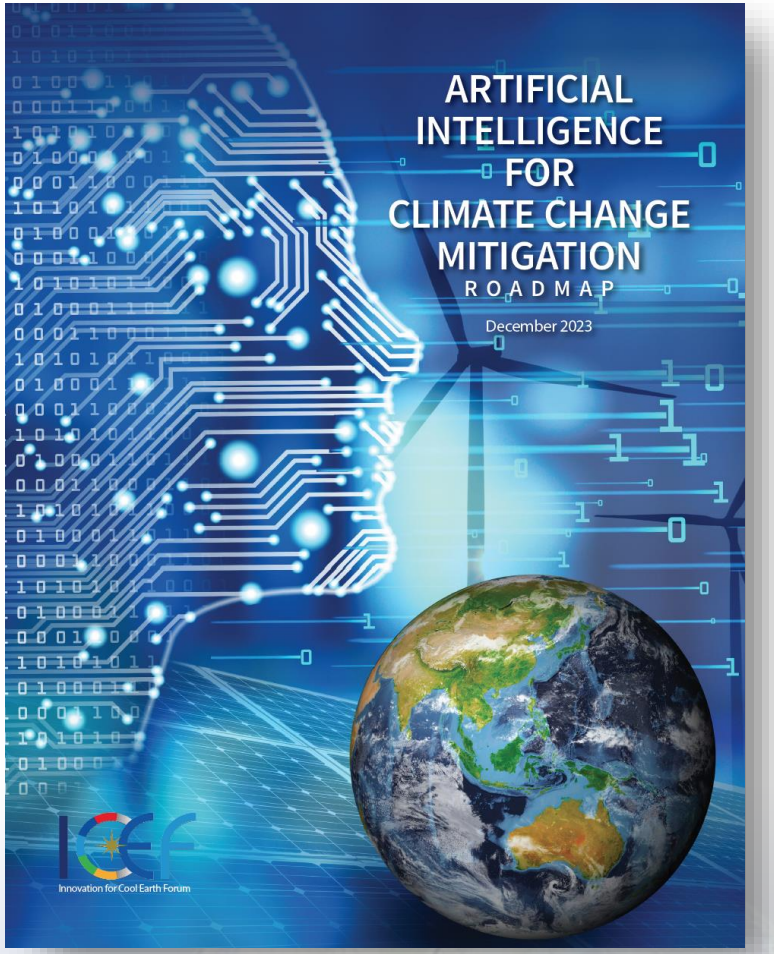
- Chapter 1. INTRODUCTION TO ARTIFICIAL INTELLIGENCE
- Chapter 2. INTRODUCTION TO CLIMATE CHANGE

PART II: **HIGH-POTENTIAL OPPORTUNITIES**

- Chapter 3. GHG EMISSIONS MONITORING
- Chapter 4. POWER GRID
- Chapter 5. MANUFACTURING
- Chapter 6. MATERIALS INNOVATION
- Chapter 7. FOOD SYSTEMS
- Chapter 8. ROAD TRANSPORT

PART III: **CROSS-CUTTING TOPICS**

- Chapter 9. BARRIERS
- Chapter 10. RISKS
- Chapter 11. POLICY
- Chapter 12. FINDINGS AND RECOMMENDATIONS



Part II:
HIGH-POTENTIAL OPPORTUNITIES

Chapter 3: GHG EMISSIONS MONITORING

AI is helping to significantly improve information on sources of greenhouse gas (GHG) emissions.

- *Analyzing vast amounts of data* from earth-observation satellites, airplanes, drones, land-based monitors, the Internet of things, social media and other technologies

AI has been particularly important in improving *methane emissions* monitoring.

- Processing data from methane sensors at scale
- Combining input from multiple satellites
- Integrating satellite information with data generated by other types of sensors

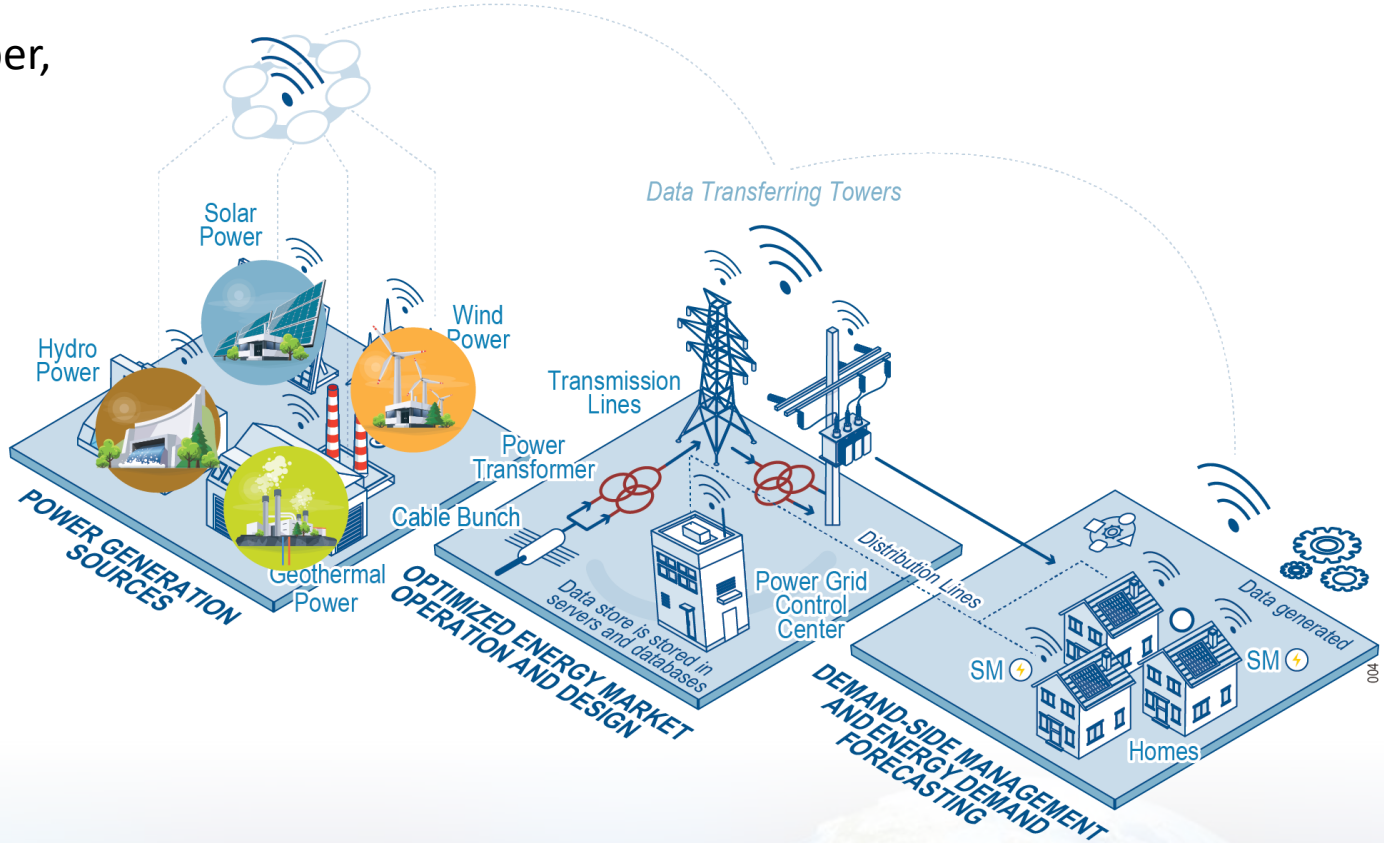
AI is also being used to better understand sources of CO_2 *emissions*.

- AI algorithms can be trained to survey the world's vegetation at high spatial resolution.

Japanese IBUKI-2 GHG monitoring satellite

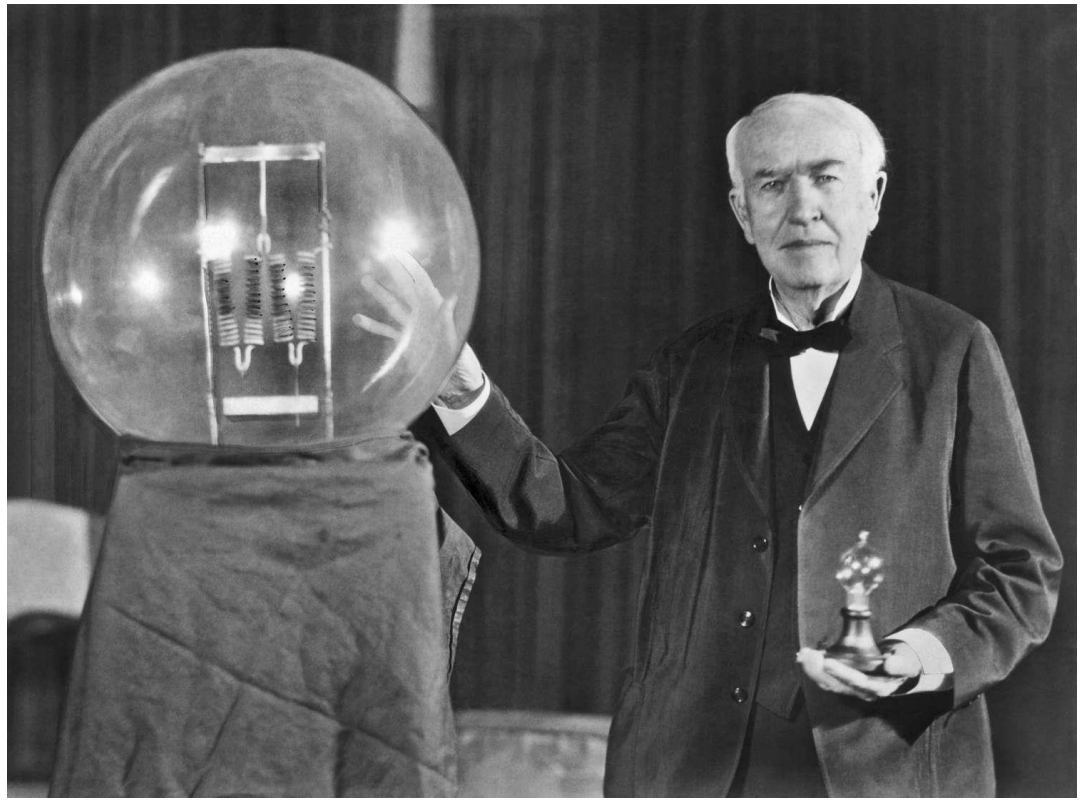
Chapter 4: **POWER SECTOR**

- AI is becoming an essential part of power grid infrastructure.
- AI can make decarbonization of the power grid cheaper, faster and smoother, helping with:
  - predictions,
  - scenario generation,
  - optimization, and
  - system planning and integration.
- AI can help in all parts of the power grid, including:
  - generation,
  - transmission and distribution
  - end use, and
  - energy storage.
- Barriers include:
  - lack of well-developed models, and
  - lack of trained personnel.
- Using AI in real-time operations creates security and safety risks.



Chapter 6: MATERIALS INNOVATION

- High-performance materials are essential for decarbonization
- Historically, new materials were discovered by accident or exhaustive, expensive experiments (e.g. Edison's light bulb)
- In recent decades, it has become possible to computationally predict whether new materials will have useful properties - but it is slow
- AI can dramatically accelerate this capability



Thomas Edison and his light bulb

Part III: CROSS-CUTTING ISSUES

Chapter 9: BARRIERS

Five groups of barriers impede the use of AI for climate change mitigation:

- data
- people
- computation
- cost
- institutions

Chapter 10: **RISKS**

Risks from AI can include:

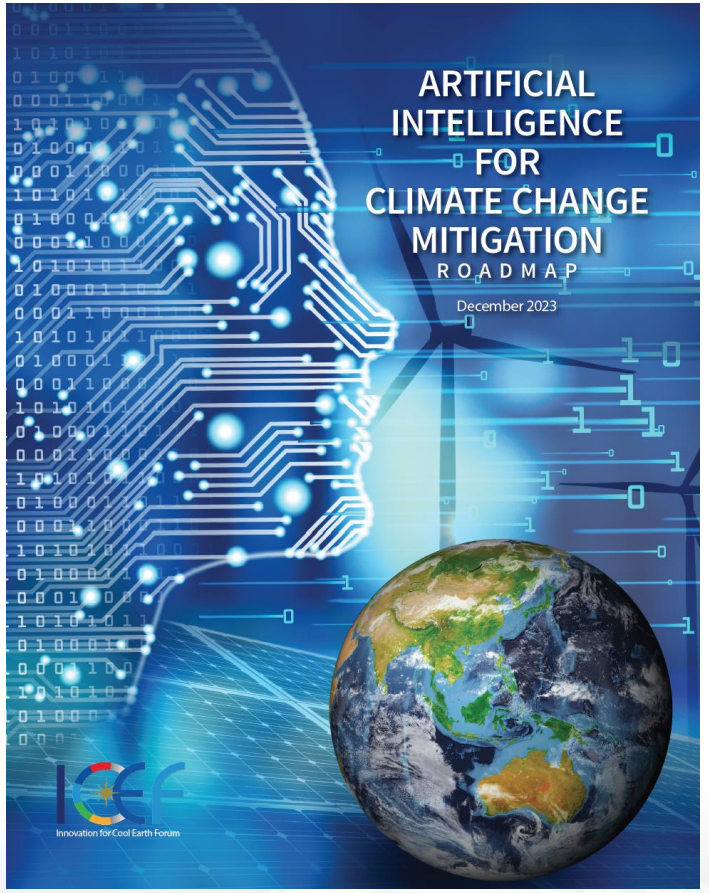
- bias,
- invasions of privacy,
- security threats,
- safety issues, and
- increased greenhouse emissions.

These risks exist when using AI for climate change mitigation.

Chapter 12: **FINDINGS AND RECOMMENDATIONS**

RECOMMENDATIONS

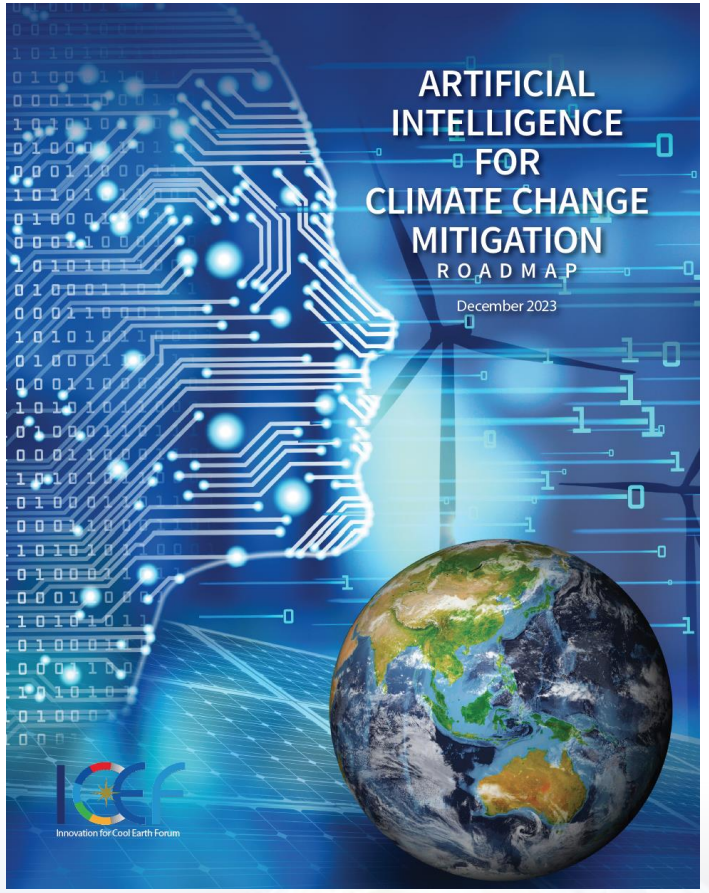
1. AI tools should be integrated into many aspects of climate change mitigation.
2. AI skills-development should be a priority in all institutions with a role in climate mitigation.
   - Educational institutions at all levels should offer courses relevant to AI.
   - Government agencies, businesses and civil society should regularly review the capabilities of their staffs with respect to AI.
3. Governments should assist in the development and standardization of data for AI applications that mitigate climate change.
4. All government agencies with responsibility for climate change should create an AI Office.



Chapter 12: **FINDINGS AND RECOMMENDATIONS**

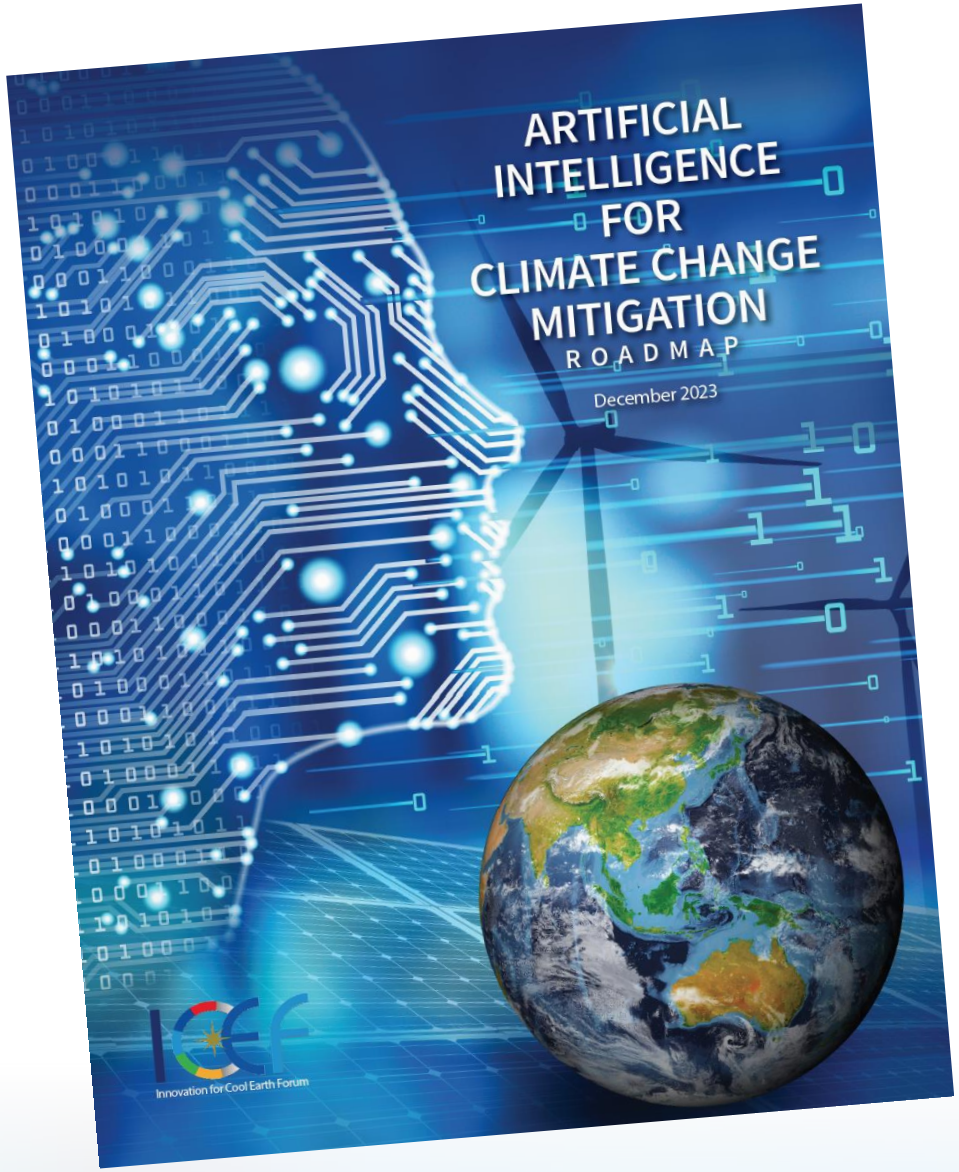
RECOMMENDATIONS

5. Electric utilities should be incentivized to deploy artificial intelligence, with regulated returns for investments in AI and other tools.
6. Governments should launch international platforms to support cooperative work on AI for climate change mitigation.
7. Governments should work to minimize greenhouse gas emissions from AI's computing infrastructure.
8. Avoiding unfair bias should be a core, high-priority principle guiding the development of all AI tools for climate change mitigation.



INNOVATION ROADMAP PROJECT

- 12 clean energy roadmaps since 2015
  - *Artificial Intelligence for Climate Change Mitigation (final to be released at COP28)*
  - Others include Low-Carbon Ammonia (2022), Carbon Mineralization (2021), Biomass Carbon Removal & Storage (BiCRS) (2020), Industrial Heat Decarbonization (2019), Direct Air Capture (2018)
- Sponsored by Japan's Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO)



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